# UEI Hardware

# 1. Hardware Support

| | | WIN-30D | WIN-30DA |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 16 | 16 |
| | Differential | - | - |
| | Simultaneous Sampling | No | No |
| | Max Sampling Rate | 1 MHz | 1 MHz |
| | Resolution | 12 bits | 12 bits |
| | S/W Program Gain | No | No |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | - | 4 |
| | Max Output Rate | - | S/W |
| | Resolution | - | 2 16-bit, 2 12-bit |
| | S/W Program Gain | - | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-30DS | WIN-30DS/4 |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 16 | 16 |
| | Differential | - | - |
| | Simultaneous Sampling | Yes | Yes (4 Chs) |
| | Max Sampling Rate | 750,000 Hz | 750,000 Hz |
| | Resolution | 12 bits | 12 bits |
| | S/W Program Gain | No | No |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-30PGH | WIN-30PGL |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 8 | 8 |
| | Differential | 8 | 8 |
| | Simultaneous Sampling | No | No |
| | Max Sampling Rate | 1 MHz | 1 MHz |
| | Resolution | 12 bits | 12 bits |
| | S/W Program Gain | 1,2,4,8 | 1,10,100,1000 |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-30PGSH | WIN-30PGSL |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 8 | 8 |
| | Differential | 8 | 8 |
| | Simultaneous Sampling | Yes | Yes |
| | Max Sampling Rate | 750,000 Hz | 750,000 Hz |
| | Resolution | 12 bits | 12 bits |
| | S/W Program Gain | 1,2,4,8 | 1,10,100,1000 |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-3016D | WIN-3016DA |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 16 | 16 |
| | Differential | - | - |
| | Simultaneous Sampling | No | No |
| | Max Sampling Rate | 200,000Hz | 200,000Hz |
| | Resolution | 16 bits | 16 bits |
| | S/W Program Gain | No | No |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | - | 4 |
| | Max Output Rate | - | S/W |
| | Resolution | - | 2 16-bit, 2 12-bit |
| | S/W Program Gain | - | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-3016DS | WIN-3016DS/4 |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 16 | 16 |
| | Differential | - | - |
| | Simultaneous Sampling | Yes | Yes (4 chs) |
| | Max Sampling Rate | 200,000 Hz | 200,000 Hz |
| | Resolution | 16 bits | 16 bits |
| | S/W Program Gain | No | No |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-3016PGH | WIN-3016PGL |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 8 | 8 |
| | Differential | 8 | 8 |
| | Simultaneous Sampling | No | No |
| | Max Sampling Rate | 200,000 Hz | 200,000 Hz |
| | Resolution | 16 bits | 16 bits |
| | S/W Program Gain | 1,2,4,8 | 1,10,100,1000 |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

| | | WIN-3016PGSH | WIN-3016PGSL |
|---|---|---|---|
| **Analog Inputs** | Single Ended | 8 | 8 |
| | Differential | 8 | 8 |
| | Simultaneous Sampling | Yes | Yes |
| | Max Sampling Rate | 200,000 Hz | 200,000 Hz |
| | Resolution | 16 bits | 16 bits |
| | S/W Program Gain | 1,2,4,8 | 1,10,100,1000 |
| **Digital Inputs** | | 24 | 24 |
| | Max Sampling Rate | S/W | S/W |
| **Counter Timer Inputs** | | - | - |
| **Analog Outputs** | | 4 | 4 |
| | Max Output Rate | S/W | S/W |
| | Resolution | 2 16-bit, 2 12-bit | 2 16-bit, 2 12-bit |
| | S/W Program Gain | No | No |
| **Digital Outputs** | | 24 | 24 |
| | Max Output Rate | S/W | S/W |

The WIN-30 drivers for Snap-Master can accommodate up to eight I/O boards. The maximum number of boards installed in one computer depends on the configuration of the hardware. Each board must have its own unique setting for the Base Address, and Interrupt Level. These settings must also be different from all other components in the computer (such as disk drives, printers, pointing devices, etc.).

This hardware section discusses only special operating instructions unique to the use of UEI hardware with Snap-Master. For detailed specifications and information on the entire range of UEI hardware refer to the WIN-30 Reference Manual supplied with your board.

For information on the settings for each element, please refer to the Data Acquisition section of the Snap-Master User's Manual.

## 1.1. UEIDAQ operation

There are three components to the UEIDAQ for Snap-Master drivers:

1. The UEIDAQ for Snap-Master driver. This is a DLL which translates Snap-Master function calls to UEIDAQ functions.

2. The UEIDAQ DLL. All I/O requests for any UEI board under Windows 3.1 go via this DLL. It serves to synchronize all driver activity, and allows full multi-tasking.

3. The UEIDAQV virtual device driver. This driver handles all high speed I/O operations, as well as providing access Ring 0 access to the DLL.

Windows support is provided as follows:

1. Windows 3.1 enhanced mode only is supported. Operation under Windows 3.0 or earlier, or in Windows 3.1 standard mode is not possible.

2. A minimum configuration of a 386 processor and 4 MBytes of memory is required. A 386DX or 486 processor and 8 Mbytes of memory are recommended.

3. Windows 3.1 support is via a DLL (Dynamic-Link Library) and a virtual device driver (Vxd). Both of these must be accessible to Windows for the driver system to operate. The DLL is UEIDAQ.DLL, and the Vxd is UEIDAQV.386

4. Windows locates a dynamic-link library by searching the same directories it searches to find an application module. For Windows to the find the library, it must be in one of the following directories, which Windows searches in the order listed:

    - The current directory.
    - The Windows directory (the directory containing WIN.COM).
    - The Windows system directory (the directory containing such system files as GDI.EXE).
    - Any of the directories listed in the PATH environment variable.
    - Any directory in the list of directories mapped in a network.

Microsoft recommends that DLL's be loaded into the Windows system directory. This is where the default installation program places UEIDAQ.DLL, but any other valid position is acceptable

In order for Windows to load the UEIDAQV Vxd, the following line must appear in the [386ENH] section of the Windows SYSTEM.INI file: "device=c:\uei\ueidaqv.386". This assumes that the Vxd is in the default location, the c:\UEI directory. If it is not, then the line should be modified accordingly. Once again, this is automatically done by the default installation program.

# 2. Analog Input (A/D)

## 2.1. A/D Settings

### 2.1.1. Pacing

WIN-30 boards for Snap-Master operate in burst mode (also called block mode). To use External Pacing, the pacer must provide a pulse for each conversion period. For example, to sample two channels at 1000 Hz each, the pacer must provide a 1000 Hz clock signal, or a pulse every 1/1000th of a second. Consult the WIN-30 Reference Manual for more detailed information on block mode operation and using an external clock.

Several boards in the WIN-30 series support simultaneous sampling (DS, DS/4 and PGS boards). Under Snap-Master, simultaneous sampling is always enabled, and no special action is required to select it.

The WIN-30 series hardware operates with its external trigger permanently enabled. This allows for “gated” pacing using a digital input to the external trigger. When the external trigger input is a logical high, clock pulses are produced for pacing. If the external trigger input goes to a logical low, clock pulses are not produced and the conversions do not occur. Consult the WIN-30 Reference Manual for more detailed information on external trigger operation.

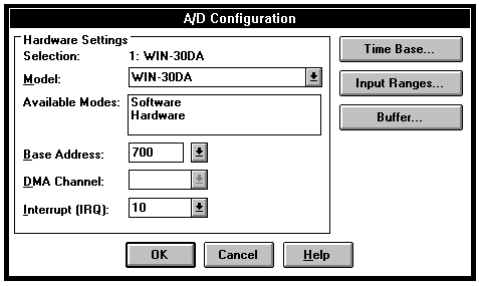
### 2.1.2. Channel List

All of the WIN-30 series of boards except the PG models support 16 Single-Ended analog input channels. The PG models (WIN-30PGL, WIN-30PGL) support 8 Differential analog input channels. Selecting the correct model from the Configuration dialog automatically sets the correct number of inputs.

# 3. Device Configuration and Hardware Settings

This section presents the hardware settings for the WIN-30 series of boards, along with the corresponding setting in the Snap-Master Configuration dialog. For more detailed information on specific UEI boards consult the WIN-30 Reference Manual.

## 3.1. WIN-30 Series




### 3.1.1. Available Modes

| | |
|---|---|
| A/D | Software, Hardware |
| D/A | Software |
| Digital In | Software |
| Digital Out | Software |

### 3.1.2. Base Address

The base address is set using switches 3 to 8 on the board's DIP switch. The factory setting is 700 hex (or H700), and takes 32 consecutive address locations (from H700-H71F). For more detailed information on the base address settings consult the WIN-30 Reference Manual.

### 3.1.3. DMA Channel

Snap-Master does not use DMA with the WIN-30 boards, so no setting is required and this control is disabled.

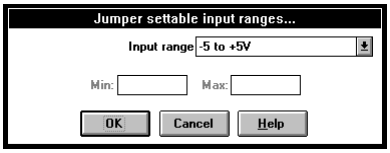
### 3.1.4. Interrupt Level

The WIN-30 series of boards have a software programmable Interrupt Level. The IRQ can be set to 2, 3, 5, 7, 10, 11, 12, 14, or 15. Each board **MUST** have a unique IRQ Level. Refer to Appendix E for information on the standard allocations for interrupts in a PC.

### 3.1.5. Time Base (A/D Only)

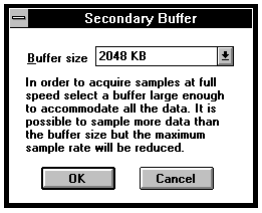
The WIN-30 drivers for Snap-Master make use of a 10 Mhz timer clock as shown in the Time Base dialog. This setting is made automatically so no further input is required.

### 3.1.6. Input Ranges (A/D Only)




The global range for all A/D inputs is software settable using the Input Ranges dialog from the Configuration. For the PG models, the channel gains are set from the A/D Settings dialog.

### 3.1.7. Secondary Buffer (A/D Only)




The secondary buffer allows large data sets to be acquired. This is especially important with the high acquisition rates of the WIN-30 series boards. The WIN-30 hardware driver sends data from the hardware to the buffer specified in the Secondary Buffer dialog first, then from the secondary buffer to Snap-Master.

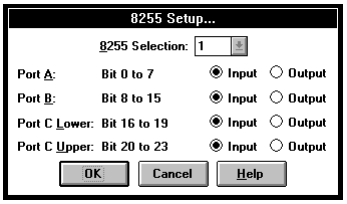
The default setting of 2048 KB (or 2 MB) works well for most data acquisition tasks. If you receive a “Buffer Memory Overflow” error message in the Status Log, the size of the Secondary Buffer should be increased.

### 3.1.8. Output Ranges (D/A Only)

The range of the D/A board outputs is Bipolar (±5V) when set to the WIN-30 mode. It is not necessary to select an output range for the hardware.

In Snap-Master, channels 0 and 1 are the 16-bit output channels and channels 2 and 3 are the 12-bit output channels.

### 3.1.9. 8255 Setup (Digital In, Digital Out)




The 8255 Setup dialog specifies which digital ports are used as inputs (Digital In) and which are used for outputs (Digital Out). The 8255 Selection selects the 8255 chip being programmed (for hardware with a single 8255 chip, this is always 1). The corresponding digital bit numbers will be posted near each of the programmable port names (A, B, C Upper, or C Lower).

### 3.1.10. Connections

The WIN-30 series boards have two 50-pin connectors - one for analog signals (on the back plate of the board) and one for digital signals (on the board at a right angle to the back plate). The following diagrams show the signal locations on the connectors in case you want to provide your own termination.

| Single-Ended | Differential | Pin | | Differential | Single-Ended |
|---|---|---|---|---|---|
| A/D 0 | A/D 0 High | 1 | 2 | A/D 0 Low | A/D 8 |
| Analog Ground | | 3 | 4 | A/D 1 Low | A/D 9 |
| A/D 1 | A/D 1 High | 5 | 6 | Analog Ground | |
| A/D 2 | A/D 2 High | 7 | 8 | A/D 2 Low | A/D 10 |
| Analog Ground | | 9 | 10 | A/D 3 Low | A/D 11 |
| A/D 3 | A/D 3 High | 11 | 12 | Analog Ground | |
| A/D 4 | A/D 4 High | 13 | 14 | A/D 4 Low | A/D 12 |
| Analog Ground | | 15 | 16 | A/D 5 Low | A/D 13 |
| A/D 5 | A/D 5 High | 17 | 18 | Analog Ground | |
| A/D 6 | A/D 6 High | 19 | 20 | A/D 6 Low | A/D 14 |
| Analog Ground | | 21 | 22 | A/D 7 Low | A/D 15 |
| A/D 7 | A/D 7 High | 23 | 24 | Analog Ground | |
| (no connection) | | 25 | 26 | D/A 0 (16 bit) | |
| Analog Ground | | 27 | 28 | D/A 1 (16 bit) | |
| D/A 2 (12 bit) | | 29 | 30 | D/A 3 (12 bit) | |
| Ground | | 31 | 32 | -12 Volts | |
| +12 Volts | | 33 | 34 | External Trigger | |
| External Clock | | 35 | 36 | Digital Ground | |
| STB+ | | 37 | 38 | STB- | |
| Digital Ground | | 39 | 40 | Digital I/O Port B0 | |
| Digital I/O Port B1 | | 41 | 42 | Digital Ground | |
| Digital I/O Port B2 | | 43 | 44 | Digital I/O Port B3 | |
| Digital Ground | | 45 | 46 | Digital I/O Port B4 | |
| Digital I/O Port B5 | | 47 | 48 | Digital I/O Port B6 | |
| Digital I/O Port B7 | | 49 | 50 | Digital Ground | |

*WIN-30 Analog Connections*

| | Pin | | |
|---|---|---|---|
| Digital I/O Port A0 | 1 | 2 | Digital Ground |
| Digital I/O Port A1 | 3 | 4 | Digital Ground |
| Digital I/O Port A2 | 5 | 6 | Digital Ground |
| Digital I/O Port A3 | 7 | 8 | Digital Ground |
| Digital I/O Port A4 | 9 | 10 | Digital Ground |
| Digital I/O Port A5 | 11 | 12 | Digital Ground |
| Digital I/O Port A6 | 13 | 14 | Digital Ground |
| Digital I/O Port A7 | 15 | 16 | Digital Ground |
| Digital I/O Port B0 | 17 | 18 | Digital Ground |
| Digital I/O Port B1 | 19 | 20 | Digital Ground |
| Digital I/O Port B2 | 21 | 22 | Digital Ground |
| Digital I/O Port B3 | 23 | 24 | Digital Ground |
| Digital I/O Port B4 | 25 | 26 | Digital Ground |
| Digital I/O Port B5 | 27 | 28 | Digital Ground |
| Digital I/O Port B6 | 29 | 30 | Digital Ground |
| Digital I/O Port B7 | 31 | 32 | Digital Ground |
| Digital I/O Port C0 | 33 | 34 | Digital Ground |
| Digital I/O Port C1 | 35 | 36 | Digital Ground |
| Digital I/O Port C2 | 37 | 38 | Digital Ground |
| Digital I/O Port C3 | 39 | 40 | Digital Ground |
| Digital I/O Port C4 | 41 | 42 | Digital Ground |
| Digital I/O Port C5 | 43 | 44 | Digital Ground |
| Digital I/O Port C6 | 45 | 46 | Digital Ground |
| Digital I/O Port C7 | 47 | 48 | Digital Ground |
| +5 Volts | 49 | 50 | Digital Ground |

*WIN-30 Digital Connections*